

REMARKS

The Applicant respectfully requests favorable reconsideration of the application in view of the above amendments and following remarks.

The Examiner's comments and the references cited suggest that there is either a misunderstanding of the Applicant's invention or a misreading of the references. Before specifically responding to the rejections, the Applicant will briefly describe the invention, its novelty and its distinction over the cited art.

Much effort has been directed to the development and improvement of replaceable sleeves for fuser rollers. Typically, these sleeves are hollow and cylindrical in shape and are designed to slip over a mandrel that is also typically cylindrical. Hence, there are two cylindrical objects involved; the inner diameter of the sleeve sized for snug positioning around the outer diameter of the mandrel so that, when in motion, the sleeve rotates with the mandrel.

Sleeves have typically been made from a wide variety of conductive metals such as aluminum, anodized aluminum, steel, nickel, copper and the like, as the Examiner points out, citing Heeks et al., col. 5, lines 57-59. However, the Applicant points out on page 5, lines 17-25 of the application that there is a problem with these typical metals. Electroforming nickel, for example, tends to outgas as the temperature is raised to the temperature necessary to cure the base cushion layer or the topcoat layer over the sleeve and adhesion of the sleeve to the base cushion layer is compromised. Moreover, it is known in the art that copper and copper and copper black oxide are soft metals and do not provide the stiffness and support ideal for the fuser members of the invention.

To overcome the problem, the present invention employs high temperature nickel, defined on page 5 of the application as "nickel that does not outgas, or release volatile compounds, at temperatures up to the maximum

temperature required to cure the cushion layer and the topcoat elastomer layer over the fuser member. Such temperatures may be as high as, or even higher than 300°C”.

An important part of the present invention relates to the use of a primer consisting essentially of a silane coupling agent containing epoxies, which is positioned on the outside of the sleeve to provide good bonding between the base cushion and the sleeve. A variety of primers and adhesives have been used for this purpose, but it has been found that surprisingly superior results have been achieved with this particular primer.

As shown in TABLE 1 on page 10 of the application, surprising improvements in the adhesion of the base cushion layer to high temperature nickel and bright chromate high temperature nickel are achieved using the primers of the present invention. With these materials, adhesion increases of eighteen- to twenty-fold were realized over copper, copper black oxide and electroformed nickel.

Previously, rollers adapted for use as either hard or compliant rollers required stiffening bands and other materials in order to achieve the desired range of properties. Such devices are not required with the claimed invention. The replaceable fuser member of the invention permits the flexibility to produce hard or compliant rollers with a minimum of layers and in a form such that the sleeve is readily replaced by the user. Accordingly, the present invention provides many advantages and improvements over the prior art and these improvements are attributable to the superior adhesion between the high temperature nickel and silicone rubbers or silicone resins or polymers. These improvements could not have been expected and were not taught or suggested by the cited references.

US 6,696,158 to Chen et al. discloses a fuser member, such as a fuser roller, that is made from materials designed to provide improved toner release, mechanical strength and wear resistance. In particular, the invention relates to materials suitable for use as a toner release layer in a fuser member. As the Examiner concedes, this reference does not teach a sleeve nor does it teach the primer used in the invention.

US 5,716,714 to Chen et al. discloses a fuser member designed to impart few, if any, wrinkles to a receiver passed between said fuser member and an opposing member, commonly called a pressure roller. The fuser member of that invention preferably has an aluminum core and can be coated with an epoxy-functionalized silane coupling agent suitable for use as a primer. However, a sleeve is not taught.

US 5,736,250 to Heeks et al. discloses environmentally friendly fluoroelastomers suitable for use on the surfaces of fuser members. Such surfaces are expected to exhibit toughness, chemical, physical and thermal stability and resistance to hot offset. The Examiner relies on Heeks et al. as teaching that any suitable metal, including nickel, may be used for the cylindrical core, but the reference fails to teach high temperature nickel which Table 1 of the application shows to be unexpectedly superior over the other metals in the comparative tests. Heeks et al. lists nickel but does not separately list high temperature nickel; yet the same list mentions aluminum and separately mentions anodized aluminum. It is therefore clear that Heeks et al. does not appreciate and does not teach or even contemplate high temperature nickel.

The Applicant will now address the Examiner's comments point by point.

Claims 1-14 and 16-19 stand rejected under 35U.S.C. 103(a) as being unpatentable over Chen et al (US 6,696,158) in view of Heeks et al.(US 5,736,250) and Chen et al. (US5,716,714). The Examiner contends that Chen '158 teach the invention except for the nickel sleeve and the primer being an epoxy-functionalized silane coupling agent; that Heeks '250 teach nickel sleeve 4 mounted on a mandrel 6; that Chen et al.'714 teach a fuser member with a primer that is an epoxy-functionalized silane coupling agent; hence it would have been obvious to one of ordinary skill in the art at the time of the invention to have replaced the metal sleeve of Chen'158 with the nickel sleeve

of Heeks '250 and to use the primer of Chen '714. This rejection is respectfully traversed.

In his Response to Arguments, the Examiner contends that a "cylinder" is a "sleeve" as defined in US 5,577,443 to Songer. In order to avoid being bogged down by semantics, it might be more helpful to describe the parts in terms of their function and their relationship to each other, rather than rely solely on the names they are given. The present invention describes two separate and distinct cylinders: a first hollow cylinder (sleeve) that fits over a second cylinder (the mandrel). Repeatedly throughout the description, the Applicant describes the relationship of the first to the second. The entire application is replete with descriptions that make it clear that there is (1) a hollow sleeve designed to fit snugly over (2) a mandrel. *See*, for example, the application at:

- page 1, lines 13-15, where the sleeve is described as installed on a mandrel;
- page 4, lines 12-14, where the high temperature nickel sleeve is described as having an inner diameter adapted to closely fit around the outer diameter of the mandrel;
- page 5, line 12, where the inventive fuser member is described as "readily replaced on a mandrel";
- page 5, lines 26-30, where it is suggested that desirably the mandrel should be of the same material as the sleeve so that the thermal expansion of the sleeve and the mandrel be approximately the same;
- page 6, lines 5-13 where the measurement of the inner diameter of the sleeve is discussed in relation to the outer diameter of the mandrel; and
- claims 2 and 5 that recite the difference between the two structures.

In contrast, none of the references describes similarly related structures as the application does; there are no sleeves fitting over a separate cylindrical structure. Heeks et al. teach a hollow cylindrical metal core having a heating element 6 disposed inside. The heating element 6 in Heeks et al. is not a mandrel; it is a lamp. The only other roller in Heeks et al. is backup/pressure roller 8 which cooperates with the fuser roller to form a nip or contact arc 10 through which the substrate passes. In Heeks et al., the

relationship between the metal core, the lamp and the pressure roller cannot by any stretch of the imagination be likened to the instant invention of a metal sleeve designed to fit tightly over and rotate with a mandrel.

The primer disclosed in the invention is used in combination with a high temperature nickel sleeve which the Applicant maintains is novel. Chen et al. does not teach or suggest, nor could it have been expected that the primer would achieve such improvement in the adhesion of the base cushion elastomer layer to the high temperature nickel sleeve.

Regarding claims 2 and 4; 3 and 17; 5; 6-8; 9-13; 14; 16 and 18, these claims all depend from claim 1 and are therefore novel since they bear all the limitations of claim 1. The Applicant respectfully requests that this rejection be withdrawn.

Claim 15 has been rejected under 35U.S.C. 103(a) as being unpatentable over Chen et al (US 6,696,158) in view of Heeks et al.(US 5,736,250) and Chen et al. (US 5,716,714) as applied above and further in view of Chen et al. (US 6,355,352). This rejection is respectfully traversed.

Claim 15 depends from claim 1 and is therefore novel since it bears all the limitations of claim 1. The Applicant respectfully requests that this rejection be withdrawn.

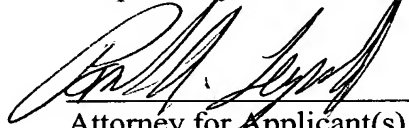
In his response to Arguments, the Examiner observes that the claims do not specifically recite that the replaceable fuser roller member has a mandrel, only that the sleeve is “adapted to” be fit around a mandrel and that the sleeve of Chen et al. ‘158 is clearly adapted to fit around a mandrel.

For reasons already discussed above, the Applicant respectfully disagrees that Chen ‘158 discloses a “sleeve” as is described in the present invention and further disagrees that the structure in Chen et al. is “clearly” adapted to fit a mandrel. Chen et al. is silent on how the diameter of that fuser member relates to the diameter of any other roll. Nonetheless, the Applicant

has amended the claims to include a mandrel. Support for the amendment can be found throughout the application, for example at page 6, lines 9-11. The Applicant has also added new claim 20, drawn to the sleeve without a mandrel. The sleeve is independently novel for reasons disclosed in the application and discussed above and does not depend on the mandrel for patentability. The Applicant has invented a novel sleeve and deserves patent protection for the sleeve as well as the sleeve in combination with a mandrel. Support for the new claim can be found at page 6, lines 5-14.*+

In view of the foregoing amendment and remarks, the Applicant respectfully submits that claims 1-19 and new claim 20 are in condition for allowance and an early Notice of Allowability is earnestly solicited.

Respectfully submitted,



Attorney for Applicant(s)
Registration No. 26,664

Paul A. Leipold/
Rochester, NY 14650
Telephone: 585 722-5023
Facsimile: 585 477-1148

If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.